

What is claimed is:

- 1           1.       A method comprising:  
2           obtaining a semiconductor structure having a metal disposed thereon; and  
3           etching at least a portion of the metal using an etching fluid while applying sonic  
4           energy to the etching fluid.
- 1           2.       The method of claim 1, further comprising:  
2           depositing a metal layer on the structure, the deposited metal layer forming  
3           reacted and unreacted metal regions, wherein the etching comprises etching at least a  
4           portion of the unreacted metal regions.
- 1           3.       The method of claim 1, wherein the obtaining comprises obtaining a  
2           semiconductor structure having a germanium substrate.
- 1           4.       The method of claim 1, wherein the obtaining comprises obtaining a  
2           semiconductor structure having a region containing germanium.
- 1           5.       The method of claim 4, wherein  
2           the obtaining comprises obtaining a semiconductor structure having nickel  
3           disposed thereon, and  
4           the etching comprises etching at least a portion of the nickel while applying sonic  
5           energy to the etching fluid.

1           6.     The method of claim 1, wherein  
2           the obtaining comprises obtaining a semiconductor structure having nickel  
3     disposed thereon, and  
4           the etching comprises etching at least a portion of the nickel while applying sonic  
5     energy to the etching fluid.

1           7.     The method of claim 1, wherein the obtaining comprises obtaining a  
2     semiconductor structure having a germanium region and nickel disposed over the  
3     substrate.

1           8.     The method of claim 1, wherein the applying the sonic energy comprises  
2     applying ultrasonic energy.

1           9.     The method of claim 1, wherein the applying sonic energy comprises  
2     applying megasonic energy.

1           10.    The method of claim 1, wherein the etching comprises etching without  
2     using an oxidant in the etching fluid.

1           11.    A method comprising:  
2           obtaining a semiconductor structure having nickel disposed thereon and a region  
3     containing germanium; and  
4           etching at least some of the nickel using an etching fluid while applying sonic  
5     energy to the etching fluid.

1           12.    The method of claim 11, further comprising:  
2           depositing the nickel on the semiconductor structure to form nickel germanide in  
3           at least one region and unreacted nickel in another region; and  
4           etching to remove at least some of the unreacted nickel.

1           13.    The method of claim 11, wherein the obtaining comprises obtaining a  
2           semiconductor structure having a germanium substrate.

1           14.    The method of claim 1, wherein the obtaining comprises obtaining a  
2           semiconductor structure having a silicon substrate having at least one germanium region.

1           15.    The method of claim 11, wherein the etching comprises etching without  
2           using an oxidant in the etching fluid.

1           16.    The method of claim 11, wherein the applying the sonic energy comprises  
2           applying ultrasonic energy.

1           17.    The method of claim 11, wherein the applying sonic energy comprises  
2           applying megasonic energy.

1           18.    A method comprising:  
2           obtaining a semiconductor structure having a germanium region and a metal  
3           disposed on the semiconductor structure; and  
4           etching at least a portion of the metal while applying sonic energy to an etching  
5           fluid.

1           19.    The method of claim 18, further comprising:  
2           depositing a metal layer on the semiconductor structure to form a metal germanide  
3           in a first region and unreacted metal in a second region, wherein the etching comprises  
4           etching at least a portion of the second region.

1           20.    The method of claim 18, wherein the obtaining comprises obtaining a  
2           semiconductor structure having a germanium substrate.

1           21.    The method of claim 18, wherein the obtaining comprises obtaining a  
2           semiconductor structure having a silicon substrate having a germanium region.

1           22.    The method of claim 18, wherein the applying the sonic energy comprises  
2           applying ultrasonic energy.

1           23.    The method of claim 18, wherein the applying the sonic energy comprises  
2           applying megasonic energy.

1           24.    A method comprising:  
2           obtaining a semiconductor structure having a region capable of being dissolved by  
3           a first etching fluid that includes an oxidant; and  
4           etching at least a portion of a layer deposited on the substrate using a second  
5           etching fluid that does not include the oxidant while applying sonic energy to the second  
6           etching fluid.

1           25.    The method of claim 24, wherein the obtaining comprises obtaining a  
2           substrate having a germanium region capable of being dissolved by the first etching fluid.

- 1           26.     The method of claim 24, wherein the application of the sonic energy  
2 provides energy to dissolve said at least a portion of the layer.
- 1           27.     The method of claim 24, wherein the applying the sonic energy comprises  
2 applying ultrasonic energy.
- 1           28.     The method of claim 24, wherein the applying the sonic energy comprises  
2 applying megasonic energy.
- 1           29.     The method of claim 24, wherein the etching at least a portion of a layer  
2 comprises etching at least a portion of a metal layer.
- 1           30.     The method of claim 24, wherein the etching at least a portion of a layer  
2 comprises etching at least a portion of a nickel layer.
- 1           31.     A method comprising:  
2           etching at least some of a metal disposed on a semiconductor structure using an  
3 oxidant-free etching fluid; and  
4           applying sonic energy to the etching fluid while etching.
- 1           32.     The method of claim 31, wherein the etching comprises etching nickel.
- 1           33.     The method of claim 31, wherein the etching comprises etching metal  
2 disposed on a semiconductor structure comprising a germanium region.
- 1           34.     The method of claim 31, wherein the applying the sonic energy comprises  
2 applying ultrasonic energy.

1           35.    The method of claim 31, wherein the applying the sonic energy comprises  
2   applying megasonic energy.

1           36.    A semiconductor structure comprising:  
2           a substrate containing a germanium region;  
3           a metal contact; and  
4           a germanide layer located between the germanium region and the metal contact.

1           37.    The semiconductor structure of claim 36, wherein the germanide layer  
2   contacts the metal contact and the germanium region.

1           38.    The semiconductor structure of claim 36, wherein the germanide layer  
2   comprises a nickel germanide layer.

1           39.    The semiconductor structure of claim 36, wherein the germanide layer  
2   comprises a silicon germanide layer.

1           40.    The semiconductor structure of claim 36, wherein the metal contact is  
2   associated with one of a source and a drain of a transistor.